

**What is claimed is:**

1        1.    A liquid crystal display device, comprising:  
2        a first substrate and a second substrate opposing each  
3        other;  
4        a liquid crystal layer formed between the first  
5        substrate and the second substrate;  
6        a plurality of scanning bus lines and a plurality of  
7        data bus lines arranged in a matrix form to  
8        define a plurality of pixel areas;  
9        a plurality of TFT devices formed in the plurality of  
10       pixels, respectively; and  
11       a plurality of pixel electrode layers formed in the  
12       plurality of pixels, respectively;  
13       wherein, in each pixel area, the pixel electrode layer  
14       is formed between a first data bus line and a  
15       second data bus line; and  
16       wherein, in each pixel area, a first space between the  
17       first data bus line and the periphery of the  
18       pixel electrode layer is different from a second  
19       space between the second data bus line and the  
20       periphery of the pixel electrode layer.

1       2.    The liquid crystal display device as claimed in  
2       claim 1, further comprising:  
3       an alignment film of a rubbing direction in the  
4       plurality of pixels, respectively;  
5       wherein, when an included angle between the rubbing  
6       direction and the data bus line is 40~50 degrees,  
7       the first space between the first data bus line

8           and the periphery of the pixel electrode layer is  
9           a liquid crystal reverse region, and the second  
10          space between the second data bus line and the  
11          periphery of the pixel electrode is a liquid  
12          crystal non-reverse region; and  
13          wherein, the first space adjacent to the liquid crystal  
14          reverse region is larger than the second space  
15          adjacent to the liquid crystal non-reverse  
16          region.

1          3.    The liquid crystal display as claimed in claim 2,  
2          wherein the first space is 4~5 $\mu$ m and the second space is  
3          2~3 $\mu$ m.

1          4.    The liquid crystal display device as claimed in  
2          claim 1, further comprising:  
3          an opaque layer overlapping the first data bus line,  
4                  the second data bus line, the first space and the  
5                  second space; and  
6          a plurality of light-shielding layers formed in the  
7                  plurality of pixel areas, respectively;  
8          wherein, in each pixel area, a first light-shielding  
9                  layer is formed between the first data bus line  
10                 and the periphery of the pixel electrode layer;  
11                 and  
12          wherein, in each pixel area, a second light-shielding  
13                 layer is formed between the second data bus line  
14                 and the periphery of the pixel electrode layer;  
15                 and  
16          wherein, a first overlapping width is defined between  
17                 the opaque layer and the first light-shielding

18 layer, and a second overlapping width is defined  
19 between the opaque layer and the second light-  
20 shielding layer.

1 5. The liquid crystal display as claimed in claim 4,  
2 wherein the first overlapping width is equal to the second  
3 overlapping width.

1 6. The liquid crystal display as claimed in claim 4,  
2 wherein the first overlapping width is different from the  
3 second overlapping width.

1 7. The liquid crystal display device as claimed in  
2 claim 6, further comprising:  
3 an alignment film of a rubbing direction formed in the  
4 plurality of pixels, respectively;  
5 wherein, when an included angle between the rubbing  
6 direction and the data bus line is 40~50 degrees,  
7 the first space between the first data bus line  
8 and the periphery of the pixel electrode layer is  
9 a liquid crystal reverse region, and the second  
10 space between the second data bus line and the  
11 periphery of the pixel electrode is a liquid  
12 crystal non-reverse region; and  
13 wherein, the first overlapping width adjacent to the  
14 liquid crystal reverse region is larger than the  
15 second overlapping width adjacent to the liquid  
16 crystal non-reverse region.

1 8. The liquid crystal display as claimed in claim 7,  
2 wherein the first overlapping width is 6.5~7.5 $\mu$ m and the  
3 second overlapping width is 4.5~5.5 $\mu$ m.

1        9.    The liquid crystal display device as claimed in  
2 claim 4, wherein the second substrate further comprises:

3        a gate insulating layer formed overlying the second  
4            substrate and covering the scanning bus lines and  
5            the light-shielding layers, in which the data bus  
6            lines are formed overlying the gate insulating  
7            layer; and

8        a passivation layer formed overlying the gate  
9            insulating layer and covering the data bus lines,  
10          in which the pixel electrode layers are formed  
11          overlying the passivation layer.

1        10.   The liquid crystal display as claimed in claim 1,  
2 wherein the first substrate further comprises a color filter  
3 layer and a common electrode layer.

1        11.   A liquid crystal display device, comprising:  
2        a first substrate and a second substrate opposing to  
3            each other;  
4        a liquid crystal layer formed between the first  
5            substrate and the second substrate;  
6        a plurality of scanning bus lines and a plurality of  
7            data bus lines arranged in a matrix form to  
8            define a plurality of pixel areas;  
9        a plurality of TFT devices formed in the plurality of  
10          pixels, respectively;  
11       a plurality of pixel electrode layers formed in the  
12          plurality of pixels, respectively;

13 a plurality of light-shielding layers formed in the  
14 plurality of pixel areas overlying the second  
15 substrate, respectively; and  
16 an opaque layer formed overlying the first substrate;  
17 wherein, in each pixel area, the pixel electrode layer  
18 is formed between a first data bus line and a  
19 second data bus line, in which a first distance  
20 is kept between the first data bus line and the  
21 periphery of the pixel electrode layer, and a  
22 second space is kept between the second data bus  
23 line and the periphery of the pixel electrode  
24 layer;  
25 wherein, in each pixel area, a first light-shielding  
26 layer is formed between the first data bus line  
27 and the periphery of the pixel electrode layer,  
28 and a second light-shielding layer is formed  
29 between the second data bus line and the  
30 periphery of the pixel electrode layer;  
31 wherein, the opaque layer overlaps the first data bus  
32 line, the second data bus line, the first space  
33 and the second space;  
34 wherein, in each pixel area, a first overlapping width  
35 between the opaque layer and the first light-  
36 shielding layer is different from a second  
37 overlapping width between the opaque layer and  
38 the second light-shielding layer.

1 12. The liquid crystal display device as claimed in  
2 claim 11, further comprising:

3 an alignment film of a rubbing direction formed in the  
4 plurality of pixels, respectively;

5 wherein, when an included angle between the rubbing  
6 direction and the data bus line is 40~50 degrees,  
7 the first space between the first data bus line  
8 and the periphery of the pixel electrode layer is  
9 a liquid crystal reverse region, and the second  
10 space between the second data bus line and the  
11 periphery of the pixel electrode is a liquid  
12 crystal non-reverse region; and

13 wherein, the first overlapping width adjacent to the  
14 liquid crystal reverse region is larger than the  
15 second overlapping width adjacent to the liquid  
16 crystal non-reverse region.

1 13. The liquid crystal display as claimed in claim 12,  
2 wherein the first overlapping width is 6.5~7.5 $\mu$ m and the  
3 second overlapping width is 4.5~5.5 $\mu$ m.

1 14. The liquid crystal display as claimed in claim 11,  
2 wherein the first space is equal to the second space.

1 15. The liquid crystal display as claimed in claim 11,  
2 wherein the first space is different from the second space.

1 16. The liquid crystal display device as claimed in  
2 claim 15, further comprising:

3 an alignment film of a rubbing direction formed in the  
4 plurality of pixels, respectively;

5 wherein, when an included angle between the rubbing  
6 direction and the data bus line is 40~50 degrees,  
7 the first space between the first data bus line

8           and the periphery of the pixel electrode layer is  
9           a liquid crystal reverse region, and the second  
10          space between the second data bus line and the  
11          periphery of the pixel electrode is a liquid  
12          crystal non-reverse region; and  
13          wherein, the first space adjacent to the liquid crystal  
14          reverse region is larger than the second space  
15          adjacent to the liquid crystal non-reverse  
16          region.

1          17. The liquid crystal display as claimed in claim 16,  
2          wherein the first overlapping width is 4~5 $\mu$ m and the second  
3          overlapping width is 2~3 $\mu$ m.

1          18. The liquid crystal display device as claimed in  
2          claim 11, wherein the second substrate further comprises:  
3          a gate insulating layer formed overlying the second  
4          substrate and covering the scanning bus lines and  
5          the light-shielding layers, in which the data bus  
6          lines are formed overlying the gate insulating  
7          layer; and  
8          a passivation layer formed overlying the gate  
9          insulating layer and covering the data bus lines,  
10          in which the pixel electrode layers are formed  
11          overlying the passivation layer.

1          19. The liquid crystal display as claimed in claim 11,  
2          wherein the first substrate further comprises a color filter  
3          layer and a common electrode layer.

4          20. A fabrication method for a liquid crystal display  
5          device, comprising steps of:

6 providing a first substrate;  
7 forming a plurality of scanning bus lines and a  
8 plurality of light-shielding layers overlying the  
9 first substrate;  
10 forming a gate insulating layer overlying the first  
11 substrate to cover the scanning bus lines and the  
12 light-shielding layers;  
13 forming a plurality of data bus lines overlying the  
14 gate insulating layer, in which the data bus  
15 lines and the scanning bus lines are arranged in  
16 a matrix form to define a plurality of pixel  
17 areas;  
18 forming a plurality of TFT devices in the plurality of  
19 pixels, respectively; and  
20 forming a plurality of pixel electrode layers overlying  
21 the passivation layer in the plurality of pixels,  
22 respectively;  
23 wherein, in each pixel area, the pixel electrode layer  
24 is formed between a first data bus line and a  
25 second data bus line; and  
26 wherein, in each pixel area, a first space between the  
27 first data bus line and the periphery of the  
28 pixel electrode layer is different from a second  
29 space between the second data bus line and the  
30 periphery of the pixel electrode layer.

1 21. The fabrication method for a liquid crystal  
2 display device as claimed in claim 20, further comprising a  
3 step of:



forming an alignment film of a rubbing direction  
overlying the pixel electrode and the passivation  
layer;

wherein, when an included angle between the rubbing  
direction and the data bus line is 40~50 degrees,  
the first space between the first data bus line  
and the periphery of the pixel electrode layer is  
a liquid crystal reverse region, and the second  
space between the second data bus line and the  
periphery of the pixel electrode is a liquid  
crystal non-reverse region; and

wherein, the first space adjacent to the liquid crystal  
reverse region is larger than the second space  
adjacent to the liquid crystal non-reverse  
region.

22. The fabrication method for a liquid crystal  
display device as claimed in claim 21, wherein the first  
space is 4~5 $\mu$ m and the second space is 2~3 $\mu$ m.

23. The fabrication method for a liquid crystal  
display device as claimed in claim 20, further comprising  
steps:

providing a second substrate opposing to the first  
substrate; and

forming an opaque layer overlying the second substrate,  
in which the opaque layer overlaps the first data  
bus line, the second data bus line, the first  
space and the second space;

10        wherein, in each pixel area, the first light-shielding  
11            layer is formed between the first data bus line  
12            and the periphery of the pixel electrode layer;  
13        wherein, in each pixel area, the second light-shielding  
14            layer is formed between the second data bus line  
15            and the periphery of the pixel electrode layer;  
16            and  
17        wherein, a first overlapping width is defined between  
18            the opaque layer and the first light-shielding  
19            layer, and a second overlapping width is defined  
20            between the opaque layer and the second light-  
21            shielding layer.

1        24. The fabrication method for a liquid crystal  
2 display as claimed in claim 23, wherein the first  
3 overlapping width is equal to the second overlapping width.

1        25. The fabrication method for a liquid crystal  
2 display as claimed in claim 23, wherein the first  
3 overlapping width is different from the second overlapping  
4 width.

1        26. The fabrication method for a liquid crystal  
2 display as claimed in claim 25, further comprising a step  
3 of:

4        forming an alignment film of a rubbing direction  
5            overlying the pixel electrode layer and the  
6            passivation layer;

7        wherein, when an included angle between the rubbing  
8            direction and the data bus line is 40~50 degrees,  
9        the first space between the first data bus line

10           and the periphery of the pixel electrode layer is  
11           a liquid crystal reverse region, and the second  
12           space between the second data bus line and the  
13           periphery of the pixel electrode is a liquid  
14           crystal non-reverse region; and  
15       wherein, the first overlapping width adjacent to the  
16           liquid crystal reverse region is larger than the  
17           second overlapping width adjacent to the liquid  
18           crystal non-reverse region.

1       27. The fabrication method for a liquid crystal  
2 display as claimed in claim 26, wherein the first  
3 overlapping width is 6.5~7.5 $\mu$ m and the second overlapping  
4 width is 4.5~5.5 $\mu$ m.

1       28. The fabrication method for a liquid crystal  
2 display as claimed in claim 23, further comprising steps of:  
3       forming a color filter layer overlying the second  
4       substrate;  
5       forming a common electrode layer overlying the color  
6       filter layer and the opaque layer; and  
7       forming an alignment layer overlying the common  
8       electrode layer.

1       29. The fabrication method for a liquid crystal  
2 display as claimed in claim 23, further comprising a step of  
3 forming a liquid crystal layer between the first substrate  
4 and the second substrate.

1       30. A fabrication method for a liquid crystal display  
2 device, comprising steps of:  
3       providing a first substrate;

4       forming a plurality of scanning bus lines and a  
5           plurality of light-shielding layers overlying the  
6           first substrate;  
7       forming a gate insulating layer overlying the first  
8           substrate to cover the scanning bus lines and the  
9           light-shielding layers;  
10       forming a plurality of data bus lines overlying the  
11           gate insulating layer, in which the data bus  
12           lines and the scanning bus lines are arranged in  
13           a matrix form to define a plurality of pixel  
14           areas;  
15       forming a plurality of TFT devices in the plurality of  
16           pixels, respectively;  
17       forming a plurality of pixel electrode layers overlying  
18           the passivation layer in the plurality of pixels,  
19           respectively;  
20       providing a second substrate opposing to the first  
21           substrate; and  
22       forming an opaque layer overlying the second substrate;  
23       wherein, in each pixel area, the pixel electrode layer  
24           is formed between a first data bus line and a  
25           second data bus line; and  
26       wherein, in each pixel area, a first space is kept  
27           between the first data bus line and the periphery  
28           of the pixel electrode layer, and a second space  
29           is kept between the second data bus line and the  
30           periphery of the pixel electrode layer; and  
31       wherein, in each pixel area, a first light-shielding  
32           layer is formed between the first data bus line  
33           and the periphery of the pixel electrode layer,

34           and a second light-shielding layer is formed  
35           between the second data bus line and the  
36           periphery of the pixel electrode layer; and  
37       wherein, the opaque layer overlaps the first data bus  
38           line, the second data bus line, the first space  
39           and the second space; and  
40       wherein, a first overlapping width between the opaque  
41           layer and the first light-shielding layer is  
42           different from a second overlapping width between  
43           the opaque layer and the second light-shielding  
44           layer.

1       31. The fabrication method for a liquid crystal  
2       display device as claimed in claim 30, further comprising a  
3       step of:  
4       forming an alignment film of a rubbing direction  
5           overlying the pixel electrode and the passivation  
6           layer;  
7       wherein, when an included angle between the rubbing  
8           direction and the data bus line is 40~50 degrees,  
9           the first space between the first data bus line  
10          and the periphery of the pixel electrode layer is  
11          a liquid crystal reverse region, and the second  
12          space between the second data bus line and the  
13          periphery of the pixel electrode is a liquid  
14          crystal non-reverse region; and  
15       wherein, the first overlapping width adjacent to the  
16          liquid crystal reverse region is larger than the  
17          second overlapping width adjacent to the liquid  
18          crystal non-reverse region.

1        32. The fabrication method for a liquid crystal  
2 display device as claimed in claim 31, wherein the first  
3 space is 6.5~7.5 $\mu$ m and the second space is 4.5~5.5 $\mu$ m.

1        33. The fabrication method for a liquid crystal  
2 display as claimed in claim 30, wherein the first space is  
3 equal to the second space.

1        34. The fabrication method for a liquid crystal  
2 display as claimed in claim 30, wherein the first space is  
3 different from the second space.

1        35. The fabrication method for a liquid crystal  
2 display as claimed in claim 34, further comprising a step  
3 of:

4        forming an alignment film of a rubbing direction  
5            overlying the pixel electrode layer and the  
6            passivation layer;

7        wherein, when an included angle between the rubbing  
8            direction and the data bus line is 40~50 degrees,  
9            the first space between the first data bus line  
10           and the periphery of the pixel electrode layer is  
11           a liquid crystal reverse region, and the second  
12           space between the second data bus line and the  
13           periphery of the pixel electrode is a liquid  
14           crystal non-reverse region; and

15       wherein, the first space adjacent to the liquid crystal  
16           reverse region is larger than the second space  
17           adjacent to the liquid crystal non-reverse  
18           region.

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1        36. The fabrication method for a liquid crystal  
2 display as claimed in claim 35, wherein the first  
3 overlapping width is 4~5 $\mu$ m and the second overlapping width  
4 is 2~3 $\mu$ m.

1        37. The fabrication method for a liquid crystal  
2 display as claimed in claim 30, further comprising steps of:  
3        forming a color filter layer overlying the second  
4        substrate;  
5        forming a common electrode layer overlying the color  
6        filter layer and the opaque layer; and  
7        forming an alignment layer overlying the common  
8        electrode layer.

1        38. The fabrication method for a liquid crystal  
2 display as claimed in claim 30, further comprising a step of  
3 forming a liquid crystal layer between the first substrate  
4 and the second substrate.